

What are Claimed Are:

1. A method of manufacturing a semiconductor device comprising a plurality of MOS transistors comprising the steps of:

preparing a semiconductor substrate having a plurality of active regions of a first conductivity type;

forming first gate oxide films onto said plurality of active regions;

forming an electrode layer onto said first gate oxide films;

patterning said electrode layer to form gate electrode patterns onto each of said plurality of active regions;

oxidizing the surface of said gate electrode patterns to form second gate oxide films which is integrated with said first gate oxide films, and gradually decrease in thickness from side walls of the gate electrode pattern towards a centre portion thereof;

first doping said plurality of active regions at first concentration with an impurity of a second conductivity type which is opposite to said first conductivity type using said gate electrode patterns as a mask, to dope said gate electrode patterns and the active regions on either side thereof at low concentration; and

second doping, while covering a portion of said plurality of active regions by a mask, remainder of the active regions at second concentration higher than the first concentration with an impurity of a second conductivity type, to dope the gate electrode patterns and the active regions on either side thereof at the second concentration in said remainder of the active regions.

2. The method of manufacturing a semiconductor device according to claim 1, wherein said first doping step and said second doping step comprise a step of implanting ions of an impurity.

3. The method of manufacturing a semiconductor device according to claim 2, comprising the step of forming spacers of insulating material on side walls of said gate electrode patterns, between said first doping step and said second doping step.

4. The method of manufacturing a semiconductor device according to claim 1, wherein said plurality of MOS transistors includes MOS transistors driven at first voltage and MOS transistors driven at a second voltage which is higher than the first voltage.

5. The method of manufacturing a semiconductor device according to claim 4, wherein the step of forming said first gate oxide films forms gate oxide films of the MOS transistors driven at said second voltage and the MOS transistors driven at said first voltage commonly in same processing step.

6. The method of manufacturing a semiconductor device according to claim 5, wherein the gate electrode patterns of MOS transistors driven at said second voltage are doped at a first concentration, and the gate electrode patterns of MOS transistors driven at said relatively low voltage are doped at a second concentration.

7. The method of manufacturing a semiconductor device according to claim 2, wherein said semiconductor substrate comprises a plurality of active regions of a second conductivity type, and the step of forming said first gate oxide films, the step of forming said electrode layers, the step of forming said electrode patterns, and the step of forming said second gate oxide films, are carried out commonly for said plurality of active regions of a second conductivity type.

8. The method of manufacturing a semiconductor device according to claim 7, further comprising the steps of: ion implanting an impurity of a first conductivity type at low concentration commonly in said plurality of active regions of a second conductivity type; and ion implanting an impurity of a first conductivity type at high concentration in a portion of said plurality of active regions of a second conductivity type.